January 14, 2011

Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: Programmatic Environmental Assessment for Antenna Structure Registration Program; WT Docket No. 08-61 and WT Docket No. 03-187

Dear Commissioners:

The following comments are submitted in response to Public Notice DA 10-2178 (Nov. 12, 2010), announcing the Commission's decision to conduct a Programmatic Environmental Assessment (PEA) of its Antenna Structure Registration (ASR) Program. The purpose of the PEA is to evaluate the potential environmental effects of the Commission's ASR program. The Commission states it will consider alternatives to address potential environmental effects, and will determine whether a more extensive analysis, in the form of a programmatic Environmental Impact Statement, may be required under NEPA. My comments address these issues.

My background and research pertinent to the PEA is included in my two prior comments for WT Docket No. 03-187 (William R. Evans – November 12, 2003; Old Bird Inc. April 27, 2007).

Potential environmental affects of the Commissions ASR program

My comments focus on the environmental effects of steady-burning light sources associated with and in proximity to towers that hold antennae regulated by the ASR program. Steady-burning light has been and is currently still being installed on towers for aviation obstruction warning. In some cases steady-burning light exists on the associated grounds of tower sites (e.g., TV/Radio station building lights and maintenance building lights). In some cases bright sources of steady-burning light, unassociated with towers and their facilities, are present in close proximity to tower sites.

Relatively bright steady-burning artificial light sources can induce aggregations of actively migrating passerines at night during certain low cloud ceiling weather conditions and/or during light to moderate rain.[1] The following two thermal video examples illustrate 1) typical nocturnal bird migration behavior unaffected by artificial light and 2) avian aggregation behavior associated with artificial light in low cloud ceiling & rainy conditions. Both videos include concurrent audio recording made with a directional microphone aimed at the night sky.

In the first thermal video, night migrating passerines are shown in southbound migration on a clear night over central New York State. One can see that the presumed bird targets

[1] See for example: Avery et al. 1976; Cochran & Graber 1958; Evans et al. 2007; Gauthreaux & Belser 2006; Gehring et al. 2009; Kemper 1996; Larkin & Frase 1988.

are progressing in generally straight-line paths in roughly the same direction. This is a typical pattern one documents with thermal imaging on clear or high cloud ceiling bird migration nights over much of interior eastern US. This video was made with a FLIR P65 thermal camera with a 24-degree field of view lens.

http://www.youtube.com/watch?v=0wpv4OVYDz0

The second thermal video linked below was made in the same region as the first, only two weeks later and with a skyward-facing set of 750W halogen white lights in operation.[2] In this case the wind direction was favorable for bird migration but, unlike the night of the first video, this night had a low cloud ceiling (est. 100-150 feet above ground level) along with light rain. Night migrating passerines are seen in nonlinear flights, or what is commonly referred to among ornithologists as aggregation behavior – birds meandering around in the light field instead of progressing in migration. The use of the 24-degree lens in such low cloud conditions was inefficient for documenting birds because it covered such a small cross-section of sky at low altitude. Therefore a 45-degree lens was used to pick up a wider field of view and better document the flight behavior of birds in the light field under the cloud. The trade off is that the 45-degree has less magnification so the bird targets are relatively smaller. The bird targets in this video were in many cases only ~50 ft from the camera – this was estimated via concurrent visual observations.

http://www.youtube.com/watch?v=k9cbz-t-85Y[3]

While the resolution of the thermal imaging does not substantiate that the targets in the first video are birds, the concurrent acoustic record contains a steady procession of well-recognized avian night flight calls indicating that avian nocturnal migration was occurring. In the thermal video made with the 45-degree lens, many of the targets in the light were visually confirmed to be birds and no bats were seen during the course of this study night.[4]

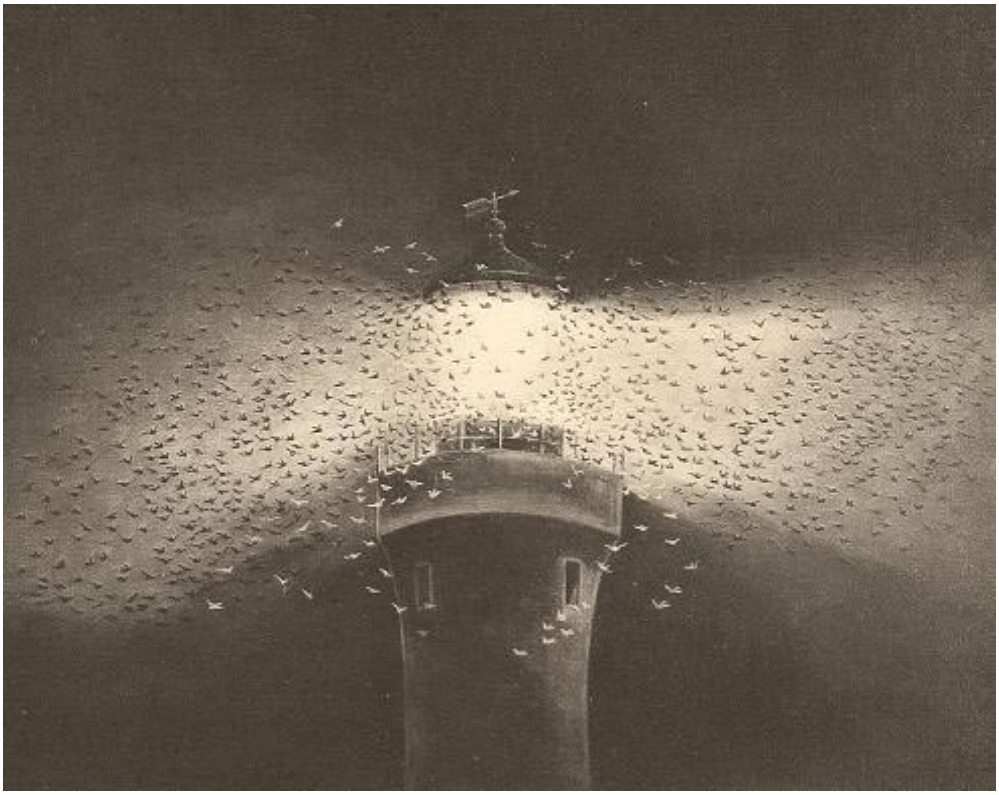
When lights were turned off periodically during the course of the avian aggregation event shown in the second video, the avian targets that were being documented via the thermal imaging quickly disappeared, and surprisingly there was thereafter not even any sign of active nocturnal bird migration. Perhaps this was because birds had been migrating at higher altitudes within the cloud (not visible with the thermal) or at lower altitude in the adjacent valley before they were drawn to the lighted area as an orientation reference. Perhaps they arose from tree perches near the study site when they saw the light. The

[2] Same setup as in Evans et al. 2007. Also note: A difference between this study and that reported in Evans et al. 2007 is that the latter studied bird aggregation in cloud and thermal imaging was not effective for documenting bird targets.

[3] At the time of submitting this comment to the FCC, there is a problem in the resolution of this video. Please check the description of this youtube link for a message regarding possible redirecting to a new link.

[4] Insect targets were also detected but because of their smaller size were only documented at very close range with the 45-degree lens and appear as out of focus, much quicker moving targets.

point here is, small songbirds came from somewhere and began to fly around in the lighted airspace shortly after the lights were turned on. I repeatedly induced such aggregations after 10+ minute periods of lights off when no birds had just prior been noted in the airspace via thermal imaging. The thermal and audio data documenting such on/off aggregation behavior on this study night is in prep for publication. Upon request I can provide it to the FCC and their consultant for consideration in the PEA. However, this data really documents nothing new. It is simply a visual demonstration of the well-known phenomenon that isolated bright light sources of steady-burning light induce aggregation behavior of night-migrating passerine on low cloud or rainy nights – for example, the illustration below by Miriam E. Clarke, the frontispiece for her husband William Eagle Clarke's two-volume classic *Studies in Bird Migration* (1912). The image depicts a massive bird aggregation event on the foggy night of October 12, 1901 at England's Eddystone Lighthouse.



The previously shown thermal indication of avian aggregation in steady-burning artificial light is the same aggregation behavior I previously documented via acoustic and visual techniques at the same study site in 2005 (Evans et al. 2007).

It is also the same avian aggregation behavior that was uniquely documented by the seminal Cochran and Graber bird aggregation study at an FCC-regulated antenna structure near Champaign, Illinois (Cochran and Graber 1958), and later by Avery et al. at another FCC-regulated antenna structure in North Dakota (Avery et al. 1976) – these studies showed that if one turns off the avian obstruction lights on a tall antenna structure

when an avian aggregation event is occurring, the bird aggregation activity in the vicinity of the tower quickly dissipates.

This is also the same avian aggregation behavior that Larkin and Frase documented via radar at an FCC-regulated antenna structure in northern Michigan during low cloud conditions (Larkin & Frase 1988). When skies cleared in their study, no aggregation occurred.

It is the same avian aggregation behavior that was differentially shown by Gauthreaux & Belser (2006) to be occurring under low cloud conditions in South Carolina at a 1000-ft red-lit FCC-regulated antenna structure (alternating steady-burning and flashing), while not occurring at a nearby 1000-ft FCC-regulated antenna structure with white strobes.

This is also the same aggregation behavior that occurs at bright light sources in general -- lighted convenient stores, car lots, schools, etc. in otherwise relatively dark terrain on low cloud ceiling or rainy nights. But avian fatalities at such avian aggregation events are most frequently observed in cases when there are tall man-made structures in the vicinity of the lighted airspace, and especially tall towers with supporting guy wires. In the low cloud ceiling thermal study night shown above (video #2), if there had been a 300-ft guyed cell tower at the study cite, one can surmise that birds involved with such low-altitude nonlinear flight would have been at risk of collision with the relatively less visible supporting guy wires coursing through the open airspace.

The evidence is clear that any FCC-regulated antenna on a tall tower with steady-burning light (on tower or in close proximity) has the potential to cause aggregation behavior of night migrating passerines. Such aggregation behavior has long been tied to mass avian fatality events, many of which have been noted in the record for the 03-187 proceeding. The following link connects to a portion of the historic video of one such event filmed by Dr. Charles Kemper.[5]

http://www.youtube.com/watch?v=iTTqcBAcPiw

While the video is not the greatest quality, it gives one a sense of what a large towerkill must have looked like – hundreds of carcasses strewn all over, on top of buildings and across lawns and roadways. Dr. Kemper's long-term avian towerkill study in which he and associates salvaged over 121,560 avian carcasses is well known (Kemper 1996). What is less well known is that in the period from Sep 2 – Oct 1, 1964 Dr. Kemper and associates salvaged over 26,000 dead songbirds on the grounds in the vicinity of the WEAU-TV tower in downtown Eau Claire, WI. In other words, over 21% of the total number of carcasses reported in Dr. Kemper's then 38-year towerkill study summary were tallied in just 29 days in 1964.

Dr. Kemper's video clearly shows that at one point two towers existed at his study site. He has stated that before the 1000-ft guyed tower was built in the summer of 1957, there

[5] Dr. Kemper sent a copy of the complete video he made to the FCC early on in the 03-187 proceedings. He gave me permission to put the video up on YouTube for ease in sharing with those interested.

was only a single approximately 500-ft freestanding lattice tower (shorter tower seen in video). This tower did not have guy wires and Dr. Kemper had checked this tower for fatalities during the previous four years without finding a single bird carcass. He noted that this shorter tower was taken down and replaced with a 2000-ft tower 40 miles west of Eau Claire in Fairchild, WI in 1965. This is interesting because after 1964, while large fatality events still occurred, the highest single-night kills were several that were around 2000 birds (including one as late as 1990). However, there were no more "megakills" of 5000+ birds in a night, which had happened on at least four occasions before 1965. One possibility for this is because the approximately 500-ft tower that had been present before 1965, while it didn't have guy wires, would have had several tiers of steady-burning red aviation obstruction lighting. These extra steady-burning light sources in the atmosphere near the 1000-ft tower's steady-burning lights undoubtedly added to the attraction of these tower's vicinity for disoriented birds before 1965, and was likely at least partially responsible for the larger kills then.

Diverting briefly, I would like to bring the FCC's attention briefly back to my study on avian attraction to colored and flashing light (Evans et al. 2007). In that study we did not find that bird aggregation occurred in our red light study periods. This seemed to contradict the existing evidence that avian aggregation events occur around towers with red aviation obstruction lighting. But since 2007, we have repeated the study using 4 x 705W halogen lights with red filters instead of just two (as used in the previous field work) and found that red light did induce avian aggregation. We surmise that the reason for the lack of attraction to red light in our previous study is that birds' night (scotopic) vision, relying on rod cells, is much less sensitive to red wavelengths as compared to blue or green (i.e., spectral sensitivity curve of rhodopsin). In summary, our light study tests since 2007 have independently corroborated that red light can induce bird aggregation; it simply needs to be relatively brighter than "colors" of shorter wavelength in order to be effective.

The other important item to note in the Kemper video is that the tower location was in downtown Eau Claire, WI. We see buildings around that undoubtedly had associated steady-burning artificial light. We don't know the layout of the city's artificial night lighting and whether there may have been any relatively bright source around the tower site, but other city light sources and their accrued light field undoubtedly played some role in aggregation events on low cloud ceiling migration nights -- perhaps it augmented kills at the tower or perhaps it reduced them by tending to spread out the aggregation phenomenon to some extent over the area of the small city. We will likely never know how the specific dynamics of the overall array of lights in the vicinity of this tower kill study site contributed to kills.

Although the evidence of steady-burning light in causing bird aggregation and associated bird kills has been put before the FCC since at least the 1999 Cornell towerkill workshop,[6] there have been a number of studies that have come to light since that time

[6] A workshop sponsored by the United States Fish & Wildlife Service, the Ornithological Council, and the American Bird Conservancy held at the 119th meeting of the American Ornithologists' Union, Cornell University - August 11th, 1999. http://www.towerkill.com/activism/workshop/index.html

that have clarified the issue. The reason the role of steady-burning light is important for the FCC to consider and acknowledge in the PEA is because steady-burning light in the vicinity of FCC-regulated antenna structures substantially augments collision risk to night migrating passerines. It leads to aggregation behavior on low cloud ceiling or rainy nights – resulting in birds meandering in flight in the light field instead of making progress in migration. It causes individual birds to make multiple passes through the gauntlet of steel guy wires associated with many FCC-regulated antenna structures. It therefore substantially increases the likelihood of avian fatalities.

With this specific concern magnified, I discuss below actions the FCC might take to minimize the impacts of steady-burning light in the vicinity of the antenna structures it regulates:

1. With regard to aviation obstruction lighting, the recent study by Gehring et al. provides a preliminary evidence of the relative avian impacts of such light from various antenna structures (Gehring et al. 2009). That study clearly indicates that tall antenna structures with supporting guy wires and with steady-burning aviation obstruction lighting results in more avian fatalities than other antenna structures. **In order to mitigate the environmental impacts of its ASR program, the FCC could mandate that the antenna structures it regulates use flashing aviation obstruction warning lights to the extent possible given FAA recommendations for pilot safety.**

2. With regard to steady-burning light at facilities on the associated grounds of tower sites, currently the FCC does not regulate or provide guidance on minimizing the environmental impacts of such lighting. In the case pictured below, a TV station building lies directly next to its 560-ft FCC-regulated antenna structure (long dark line is shadow of tower).

The broadcast tower has white strobes and the TV station building and parking lot have at least 8 security lights outdoors, some apparently in the 500+Watt range. On several nights in the late 1990s I visited this tower site and confirmed via visual and audio means (and lots of dead birds in the TV station's parking lot) that bird aggregation was occurring in its vicinity. The tower's guy wires were an obvious collision hazard and likely were the obstacle that caused many of the bird deaths – a few birds were seen falling from the sky.

The major problem for night migrating birds here is not the white strobes on the broadcast tower[7], but the eight security lights on the TV station building and in its parking lot. The picture below (out of focus) shows a view of the TV station site from a distance. The four horizontally-lined yellowish lights are security lights on the TV station building. The two red lights are from an approximately 300-ft communications tower several hundred yards behind the TV station building. The single high white light is a flash of the first tier of white strobes on the 560-ft tower, the base of which is about 10-ft away from the TV station.

[7] Relatively few avian fatalities have ever been documented at a tall antenna structure with white strobe aviation obstruction warning lights.

The picture below is a close-up view (out of focus) of the TV station building. One can see numerous satellite dishes and a number of security lights, which are on the building. What one can't see in this or the previous picture is three bright security lights that light up the parking lot of the TV station building.

It is likely not the number of security lights as much as the angle that they directly disperse light that causes bird aggregation at this site. From my rough calculation, 25-50% of their light is cast directly toward the sky. On low cloud ceiling nights this creates an isolated small light dome that causes bird aggregation in close proximity to the 560-ft guyed, white-strobed tower. This tower is in a tower farm with numerous other tall towers in the surrounding square mile or so, including a 1000-ft red-lit tower – the kind that has been documented to cause bird aggregation and mass fatalities. However, on the night that we documented the aggregation of flying birds in the airspace over the TV station shown above, relatively few birds were noted in aggregation around 1000-ft red-lit tower (based on acoustics). Also, no dead birds were found on the grounds around that tower the following morning.

There is no doubt that artificial lighting on the grounds associated with FCC-regulated antenna structures can cause and augment avian tower kill. **In order to mitigate the environmental impacts of its ASR program, the FCC could make changes to its ASR program and provide regulations or guidance for down-shielding and minimizing artificial light on the associated grounds of tower sites.**

3. In some cases it is conceivable that bright artificial lighting adjacent to a tower site may induce bird aggregation near the tower structure leading to exacerbated avian fatalities. This aspect may be beyond FCC regulation, but **the FCC could provide guidance in its ASR regulations for choosing tower sites that are not in close proximity to existing sources of bright artificial light, especially when in otherwise relatively dark terrain.** The potential still might exist for sources of bright light to be

built in proximity after tower construction, but I suspect such cases would be relatively uncommon.

Species impacts

Perhaps multiple million are killed annually at towers in the US. It is difficult given existing data to know how many and what the impact is to any species' population. We do know that many species are in decline and such declines are likely to increase due to many reasons as human population and developments increase. We also know that the number of towers on the US continent is increasing (www.towerkill.com). It therefore seems prudent to take reasonable efforts to reduce avian fatalities.

We can think through the potential impacts on a Federally endangered species like the Kirtland's Warbler. This species nests primarily in northern Michigan. There are currently an estimated 2000 individuals on the planet. This is up from less than 200 estimated back in the mid-1970s. Millions of dollars of taxpayer money has gone into restoration of this species to a viable population level with multiple regional breeding centers. Every year literally the whole population flies to and from its winter grounds in the Bahamas. During these flights the population traverses a landscape that currently has on average about one 300-ft or higher tower every 25 square miles, in other words 1000s of towers. While on most migration nights the bulk of the migrating population will likely be flying above the height of most of the towers, inevitably weather conditions will occur that force them to contend with obstacles in the lower stratum of the atmosphere. If these obstacles have no light or flashing light, it will just be a matter of some individuals by chance avoiding a blind collision in a single pass by a tower. But if the towers have any source of steady-burning light on them or in their near vicinity, all evidence suggests that individual Kirtland's Warblers will get caught up in aggregation events involving multiple passes through the gauntlets of steel guy wires with substantially increased collision/fatality risk.

Given that Kirtland's Warbler is a night migrating passerine and given the weight of evidence that FCC-regulated antenna structures regularly kill night migrating passerines, the burden of proof that FCC-regulated towers are not "taking" this Federally endangered species annually is on the FCC. I am not aware that any element of the broadcast and communications industry has a take permit for this species. Therefore, given that steady-burning light on and in the vicinity of such towers substantially augments avian fatalities at towers, and given that there are reasonable steps that the FCC could take to minimize such impacts (previously outlined), it seems fitting for the FCC to take appropriate action on this matter.

Human impacts

What would the children of the future want us to do? I think most of us have an instinct to swerve our automobile around a turtle crossing the road. When we do so we don't rationalize how our action might affect the turtle's population. Our action is done typically out of common sense, and/or an inherent respect for wild animals. Steady-burning light on towers should be programmatically changed to the extent possible to minimize the bird aggregation potential around towers. If something as simple as instituting lighting regulations can prevent large bird kills at FCC-regulated antenna structures (e.g., 100s of birds killed in a night at some towers), then this would fit with our innate instinct for respecting other creatures.

By taking action on this steady-burning light issue, the FCC would take a large step toward satisfying the spirit of NEPA in its ASR program for the many Americans who appreciate birds, and whose tax dollars are involved with trying to maintain healthy bird populations for the foreseeable future.

Regarding whether to elevate to PEIS

In the *United States Court of Appeals for the District of Columbia Circuit* decision of February 19, 2008 it is stated:

"CEQ regulations also provide that an agency should prepare a programmatic EIS if actions are "connected," "cumulative," or "similar," such that their environmental effects are best considered in a single impact statement. *Id.* § 1508.25(a); *see also Kleppe v. Sierra Club*, 427 U.S. 390, 409-10 (1976); *Nevada v. Dep't of Energy*, 457 F.3d 78, 92 (D.C. Cir. 2006)."

Based on this statement the FCC should elevate its NEPA requirements and carry out an Environmental Impact Statement on its ASR program. For example, it is unlikely that the impact of one tower would have a significant impact on the viability of the Kirtland's Warbler, but the cumulative impact of thousands of towers could. The FCC has in its capability the power to programmatically institute relatively simple regulations (at the thousands of towers it regulates) that would mitigate potential impacts to Kirtland's Warbler.

Citations

Avery, M. Springer, P.F. & J. F. Cassel. 1976. The effects of a tall tower on nocturnal bird migration - A portable ceilometer study. *Auk* 93:281-291.

Cochran, W. W. & R. R. Graber. 1958. Attraction of nocturnal migrants by lights on a television tower. *Wilson Bulletin* 70:378-380.

Evans, W. R. Akashi, Y. Altman, N. S. & A. M. Manville II. 2007. Response of night-migrating songbirds in cloud to colored and flashing light. *North American Birds* 60:476-488.

Gauthreaux, S. A., Jr. & C. G. Belser. 2006. Effects of artificial night lighting on migrating birds. In: *Ecological Consequences of Artificial Night Lighting*. (eds. C. Rich and T. Longcore), pp. 67-93. Covelo, California: Island Press.

Gehring, J. Kerlinger, P. & A.M. Manville II. 2009. Communication towers, lights, and birds: successful methods of reducing the frequency of avian collisions. *Ecological Applications* 19(2):505-514.

Kemper, C. 1996. A study of bird mortality at a west central Wisconsin TV tower from 1957-1995. *The passenger pigeon* 58(3):219-236.

Larkin, R. P. & B. A. Frase. 1988. Circular paths of birds flying near a broadcasting tower in cloud. *Journal of Comparative Psychology* 102:90-93.

Respectfully submitted,

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